IDAHO
DEPARTMENT Of FISH & GAME

Jerry M. Conley, Director

Hagerman Fish Disease Laboratory

Annual Report

Job I. Fish Disease Investigations

Job II. Fish Hatchery Effluent Monitoring

October 1, 1979 - September 30, 1980

by

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Hagerman Fish Disease Laboratory

Job I

ABSTRACT

During the period of this report (1 October 1979 to 30 September 1980) I visited most state hatcheries at least once to observe fish condition, health, and general hatchery practices. In addition, I responded to 67 requests for diagnostic services to determine causes of excessive fish mortalities. Various diseases were diagnosed and appropriate treatments recommended. Also trips were made to several hatcheries for tissue and ovarian fluid sampling to determine presence of viruses.

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OBJECTIVES

To monitor diseases and general health of fish at the twenty-one fish cultural installations operated by the Idaho Department of Fish and Game and prescribe treatment, if necessary.

To diagnose unknown diseases at hatcheries and to prescribe prophylactic disease control measures or medicines to effect cures.

To assist hatchery personnel in any way necessary to achieve the best finished product possible.

RECOMMENDATIONS

The Department should continue to insure that all hatcheries receive publications that are applicable to fish culture such as "The Progressive Fish Culturist" and are updated on all fish health (both infectious and noninfectious diseases), prevention, control and management techniques.

The Department should continue to sponsor meetings and orientations to all hatchery personnel as they relate to fish culture to keep workers aware of new innovations and techniques **in** this field.

An effort should be made to determine optimum loadings at each hatchery and attempt not to jeopardize fish health by exceeding these densities.

An effort should also be made to determine if there is a correlation between the outbreaks of certain diseases at each hatchery with seasons of the year.

INTRODUCTION

The Idaho Department of Fish and Game operates twenty-one fish hatcheries, rearing ponds, and redistribution facilities which annually produce about 1.2 to 1.5 million pounds of fish (Fig. 1).

The project leader usually visits each hatchery at least once each year to routinely examine their fish for disease and general health. He is also available on a need basis. If disease is encountered, it is diagnosed and steps for a cure are prescribed. Hatchery management practices are also evaluated as they relate to fish health.

The project leader is on call to make an emergency call to any hatchery that develops a disease problem during the year.

The Department purchases a portion of their fish and fish eggs from other states or commercial sources. The project leader inspects these eggs and fish for disease prior to acceptance by the Department.

Fish feed samples are taken and analyzed for nutrient values and quality control.

Water supplies are frequently analyzed for chemical characteristics.

TECHNIQUES USED

The Department maintains a small laboratory located at the Hagerman Hatchery. This laboratory is equipped to provide facilities and support services where most

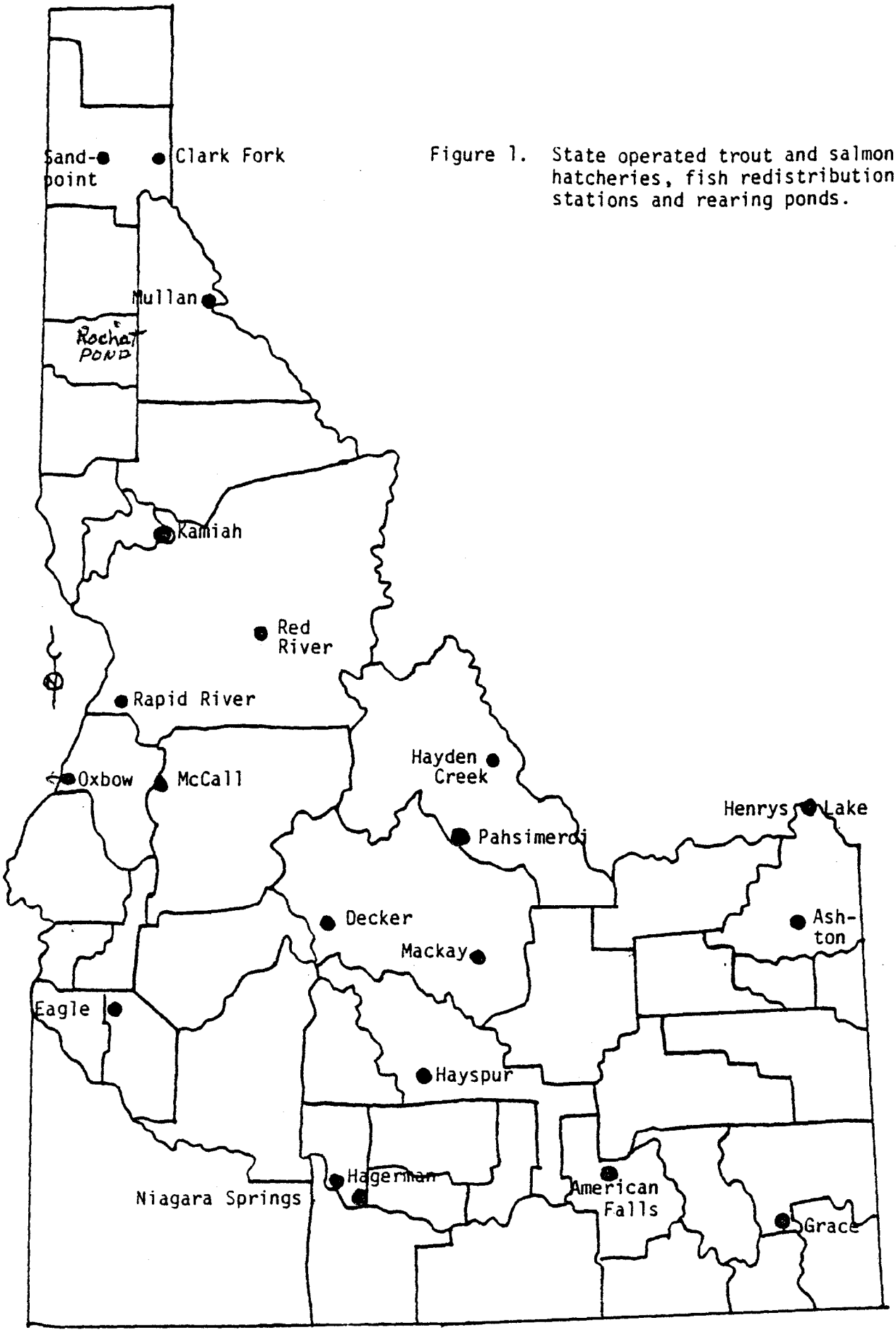

Figure 1. State operated trout and salmon hatcheries, fish redistribution stations and rearing ponds.

fish diagnostic work can be accomplished.

Necropsy procedures and diagnoses are based on standard methods established by the Fish Health Section of the American Fisheries Society and publications of research workers. Occasionally assistance is given by other state, federal and private laboratories.

Occasionally dual infections are present and no attempt is made to isolate individual species if treatment is the same for both species.

FINDINGS

There were 63 requests for diagnostic services to determine causes of excessive fish mortalities at state hatcheries from 1 October 1979 to 30 September 1980. There were another four examinations made on fish at non-state hatcheries. These calls were for major problems only and do not include many examinations or managerial and environmental problems. There were also a number of visits for sampling of tissues and ovarian fluids for virology that are not included. Many of the problems required more than one visit and in some cases recurrences of disease happened at a later date.

A summary of the general operation, location, production and diagnoses of disease problems at each fish cultural station follows.

American Falls Hatchery

American Falls Hatchery is located in Power County near American Falls. This station is primarily a rainbow trout hatchery and brood stock station, but also produces a significant number of other species. Production for the period 1 October 1979 to 30 September 1980 was about 100,000 pounds. A number of trips was made to this hatchery during the year for virology samples and diagnostic examinations on several different lots and species of fish. Findings include the following:

Virus	-Infectious Pancreatic Necrosis (IPN)	}	
	Infectious Hematopoietic Necrosis (IHN)	}	
Bacteria	-*Aeromonas* &/or *Pseudomonas* *sp.*	}	
	Yersinia ruckeri (ERM)	}	Systemic
	Aeromonas salmonicida (Furunculosis)	}	Infections
	Flexibacter *sp.*	}	
Parasites	-Copepods		
	Epistylus *sp.*		
	Costia *sp.*		
	Gyrodactylus *sp.*		
	Scyphidia *sp.*		

Fish were treated with appropriate medicated feeds and chemical flushes when necessary. No treatments were recommended in the cases of viral infections.

There was reason to suspect nutritional problems on at least two exams, but it is very difficult to substantiate. Environmental problems are prevalent at this station because of hatchery design and there is a definite need to redesign and reconstruct this station to overcome the obvious inadequacies and restrictions inherent at this facility.

Bird predation, mainly by gulls, blue and night herons are also cause for concern. Consumption by birds represents considerable losses in fingerlings and the potential of disease transfer is always a threat, not only intra-hatchery, but inter-hatchery or water supplies. Thus far, bird wires and scare-away devices have been largely ineffectual.

Ashton Hatchery

Ashton Hatchery is located in Fremont County near Ashton. Ashton is primarily a rainbow trout station, but it also produces cutthroat trout and coho salmon. Planted production for the period 1 October 1979 to 30 September 1980 was 49,000 pounds. Several visits were made to this station and diagnostic exams were made each time and usually involved several lots each time. Gill bacteria and Hexamita seems to be the main pathogens causing fish loss at this hatchery. External parasites, while present most of the time, do not appear to cause mortalities. Nutritional gill disease was suspected to cause losses on two visits.

Clark Fork Hatchery

Clark Fork Hatchery is located in Bonner County near Clark Fork. This station rears rainbow, cutthroat and kamloop trout and kokanee salmon. Planted production was 13,356 pounds from 1 October 1979 to 30 September 1980. Two trips were made to this station for tissue samples and fish exams. Findings included bacteria in gill tissues (rainbow), Hexamita in the intestinal tract of kamloops, and copepods in the cutthroat brood stock. Confirmation of IPN virus was noted in several species by USFWS at Fort Morgan, Colorado and Bozeman, Montana.

Decker Rearing Pond

This pond was not used during this time period because of an eye fluke problem and lack of funding. It is, however, the prime site being considered for a new hatchery by the Corps of Engineers to rear chinook salmon and steelhead trout.

Eagle Hatchery

Eagle Hatchery is located in Ada County near Eagle. Most production is rainbow trout, but they also raise cutthroat, brown, brook trout and kokanee salmon. Planted production for 1 October 1979 to 30 September 1980 was 22,035 pounds. No diagnostic requests were received during the year.

Grace Hatchery

Grace Hatchery is located **in** Caribou County near Grace. This station primarily produces rainbow and cutthroat trout. Planted production from 1 October 1979 to 30 September 1980 was 110,416 pounds. The following pathogens were found in five different fish exams: gill bacteria, systemic bacterial infection and Hexamita. Rangens suggested environmental or nutritional sources for losses on one occasion and reported a virus survey as negative.

Hagerman Hatchery

Hagerman Hatchery is located in Gooding County near Hagerman. This is the state's largest producer of catchable rainbow with annual production from 1 October 1979 to 30 September 1980 of 630,594 pounds. This figure includes production of rainbow, brown, kamloop trout and coho salmon.

I made a number of examinations of the various lots of fish during the year and the results include the following:

Virus	- Infectious Pancreatic Necrosis (IPN)	} Systemic
Bacteria	- Flexibacter sp.	} Infections
Parasites	- Costia sp.	
	Hexamita sp.	
	Gyrodactylus sp.	
	Ichthyophthirius multifillis	
	Eye fluke	

Afflictions were treated with appropriated chemical flushes and/or medicated feed. In the cases of viral infections, no treatments were initiated.

Predation by birds is prevalent at this hatchery and comments in the American Falls section also apply here.

Hayden Creek Hatchery

Hayden Creek Hatchery is located in Lemhi County near Lemhi and is operated as a research station for spring chinook and steelhead. Production from 1 October 1979 to 30 September 1980 was 16,107 pounds. No diagnostic requests were received during the year.

Hayspur Hatchery

Hayspur Hatchery is Idaho's oldest hatchery and is located in Blaine County near Bellevue. Hayspur is primarily a rainbow trout production and brood station, but occasionally rears other species. Production from 1 October 1979 to 30 September 1980 was 142,395 pounds. I visited this station during the study period, but no fish examinations were made.

Henrys Lake Hatchery

Henrys Lake Hatchery is located in Fremont County north of Ashton. This station is a cutthroat trout egg taking hatchery. About 809 pounds of cutthroat fry were hatched, reared and released into the lake during the planting period 1 October 1979 to 30 September 1980. I visited this station during the year, but no fish exams were made.

Kamiah Redistribution Station

The Kamiah facility is located in Lewis County near Kamiah. This station is used as a depot for redistribution of catchable trout that are raised at Hagerman (21,300 pounds). No visits were made to this station during the year.

Mackay Hatchery

Mackay Hatchery is located in Custer County near Mackay. During the planting period from 1 October 1979 to 30 September 1980, this station had released 96,075 pounds of various species, mostly rainbow trout. Several diagnostic exams revealed the presence of Hexamita, Costia, gill bacteria, and gill parasites. It was also noted on one trip that fish were extremely stressed because of low dissolved oxygen. The D.O. concentrations were recorded at 3.4 to 3.6 ppm at the inflowing waters in the headrace. This is 1 ppm lower than has been noted in the past.

McCall Hatchery

McCall Hatchery is located in Valley County at McCall. Planted production from 1 October 1979 to 30 September 1980 was 4,136 pounds of mostly summer chinook plus 37,800 pounds of catchable rainbow trout which was redistributed from Hagerman. Aeromonas or Pseudomonas was isolated from summer chinook and medicated feed was recommended. Hatchery personnel found an infestation of Trichophrya sp. in the gills of chinook and after bioassay work, initiated appropriate treatments.

Mullan Hatchery

Mullan Hatchery is located in Shoshone County east of Mullan. Planted production from 1 October 1979 to 30 September 1980 was 1,035 pounds of a variety of species. Additionally, about 16,500 pounds of catchable rainbow trout from Hayspur were redistributed. Virus surveys for IPN proved to be negative, but a mixed bacterial infection, fungus and sestonosis (gill debris) was noted in cutthroat.

Niagara Springs Hatchery

Niagara Springs Hatchery is located in Gooding County south of Wendell and is under sponsorship of Idaho Power Company for their mitigation requirements for their complex of three dams on the Snake River. Planted production from 1 October 1979 to 30 September 1980 was 319,645 pounds of steelhead trout. Several visits were made to this station and IPN virus was confirmed in one lot and suspected in two other raceways. A bacterial infection was also noted in one lot, but was never identified.

Oxbow Hatchery

Oxbow Hatchery is located on the Snake River in Oregon. This Idaho Power Company station is used as a collection, holding and spawning area for adult steelhead that return to Hells Canyon Dam. I did not have occasion to visit this facility during the year.

Pahsimeroi Hatchery

Pahsimeroi Hatchery is located in Lemhi County northeast of Challis. This Idaho Power Company hatchery is mainly a steelhead trout egg taking station for the Niagara Springs Hatchery. No necropsies were done this year, but an attempt to disinfect the eggs of IPN and IHN carrying adults was completed. These eggs were water hardened in a 1:300 concentration of Wescodyne solution.

Rapid River Hatchery

Rapid River Hatchery is another Idaho Power Company station and is located in Idaho County near Riggins. This is a spring chinook hatchery and they released 229,689 pounds from 1 October 1979 to 30 September 1980. This station has had a long history of kidney disease (KD), but the use of erythromycin phosphate in water hardening of eggs and injection of adults has significantly reduced KD outbreaks in prespawners and juveniles. Some losses due to bacterial gill disease was noted during the year.

Red River Rearing Pond

This facility is located in Idaho County near Elk City. The station raises spring chinook for release in the upper South Fork Clearwater River drainage. I did not have occasion to visit this pond during the study period. Production was about 10,000 pounds.

Rochat Rearing Pond

I visited this pond once during the year and observed some excellent Westslope cutthroat. Externally they had good fins, body confirmation and color and they appeared to be healthy with no losses. A virus check showed negative results for the fish checked.

Sandpoint Hatchery

Sandpoint Hatchery is located in Bonner County near Sandpoint. Planted production from 1 October 1979 to 30 September 1980 was 2,338 pounds and includes several species. Virus surveys proved negative at this station.

MISCELLANEOUS

I examined several perch from C. J. Strike Reservoir, but was unable to make a definitive diagnosis due to poor fish condition. It is imperative to ice samples as quickly as possible for good results. Frozen samples or samples stored in water are of no value to isolate bacteria.

Two examinations of rainbow trout from a commercial hatchery showed a systemic bacterial infection in both cases. The fish had gross lesions which made them very unappetizing. The final disposition of the survivors is unknown.

Rainbow trout from the Hagerman National Hatchery were examined and found to have a systemic bacterial infection, either Aeromonas or Pseudomonas.

IMMUNIZATIONS

The Department has embarked on a program to vaccinate rainbow trout at stations with a history of red-mouth disease (ERM). Fish are immunized with bacterin from Tavolek, Inc. and employ their shower apparatus when the fish are about 30/pound. All holdover rainbows at American Falls, Eagle and Hagerman have been immunized and to date, no outbreaks of ERM have occurred. There was one isolation of ERM at American Falls from one fish which was supposedly vaccinated.

Hagerman Fish Disease Laboratory

Job II

ABSTRACT

In compliance with the provisions of the Federal Water Pollution Control Act, fish hatcheries are authorized to discharge, under the National Pollutant Discharge Elimination System (NPDES), a restricted amount of settleable and suspended solids to receiving waters. Monitoring of these and other parameters is required. Removal of settleable solids is needed to achieve final limits of permits. Reports of findings and data storage is also required by Federal law. During the period of 1 October 1979 to 30 September 1980 we monitored effluent discharges at the 11 state fish hatcheries that fall under these criteria.

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OBJECTIVES

To monitor the effluent from 11 state fish hatcheries to insure effluent meets limitations imposed by the Environmental Protection Agency (EPA) through National Pollutant Discharge Elimination System (NPDES) Permits.

RECOMMENDATIONS

Continue monitoring hatchery effluents.

Complete construction of settling systems where needed.

TECHNIQUES USED

The Environmental Protection Agency (EPA) requires pollutant discharge permits for fish hatcheries which produce 20,000 pounds of fish or more during the year.

The Idaho Department of Fish and Game operates 11 fish hatcheries which require permits: American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman, Hayden Creek, Hayspur, Mackay, Niagara Springs* and Rapid River*.

Parameters required by permits include settleable solids, suspended solids, and water flows. Frequencies of samples and sample types vary from station to station, but generally are taken on a weekly basis. Samples are taken on incoming waters, outflows, cleaning and noncleaning situations.

Filters from each hatchery are analyzed by a commercial laboratory and results are recorded and filed. Laboratory costs are billed against the individual hatcheries.

Monthly reports are recorded and quarterly reports are submitted to EPA.

If violations occur, additional written communication is filed to EPA stating nature of violation, causes and steps taken to prevent a recurrence.

Techniques are based primarily on established procedures set forth by "Standard Methods for Examination of Water and Wastewater."

In accordance with NPDES Permits, water samples are checked for concentrations of settleable solids and suspended solids. Settleable solids are measured in an Imhoff cone and readings are taken on material settled out after 1 hour. Suspended solids are determined by filtering sample through pre-weighed filters, oven dried and again weighed to obtain net gain.

FINDINGS

We found that all readings for settleable and suspended solids fell within the limits of the permits during normal hatchery operations. However, during cleaning operations, settleable solids may exceed limitations, if no settling facility is present.

Compilation of settleable and suspended solid concentrations is presented **in** Tables 1 and 2 as well as in Figure 1. Flows in cubic feet per second (cfs) are presented for each hatchery in Table 3.

* Idaho Power Company owned.

DISCUSSION

At the inception of the NPDES Permits, one set of sampling gear was purchased to monitor hatchery effluents. This necessitated almost constant travel to the 11 hatcheries involved. Subsequently, sampling gear for each hatchery was provided and personnel were instructed as to usage and recording.

Several modifications have been made on original permits by EPA and has resulted in slightly reduced sampling. After over two years of intensive sampling, EPA has determined the area which efforts need to be concentrated in terms of pollution abatement is the settleable solids discharges.

Idaho Department of Fish and Game has completed major construction projects at Ashton, Grace, Hagerman, Clark Fork and Hayspur hatcheries to create settling lagoons for all hatchery effluent. Idaho Power Company has constructed a settling lagoon at the Niagara Springs site. Future construction may be needed at the Hayden Creek and Mackay facilities.

Table 1. Maximum settleable solid concentrations (ml/l) at Idaho hatcheries, 1 October 1979 to 30 September 1980.

Station	Settleable solid concentrations											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ashton	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Clark Fork	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<O.1	<0.1	<0.1
Eagle	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<O.l
Grace	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hagerman	<0.1	(0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hayden Creek	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hayspur	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<O.1	<0.1	<0.1	<0.1
Mackay	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<O.l	<0.1	<0.1	<0.1
Niagara Sp.*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Rapid River*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

* Idaho Power Company owned

Table 2. Maximum suspended solid concentrations (mg/1) at Idaho hatcheries, 1 October 1979 - 30 September 1980.

Station	Suspended solid concentrations											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	1.8	1.3	7.4	2.2	1.1	3.8	0.4	0.7	0.9	0.2	0.3	0.9
Ashton	2.9	14.1	2.9	3.5	1.8	3.5	3.9	3.1	5.3	8.5	1.0	6.3
Clark Fork	0.4	0.2	0.2	2.0	0.4	0.3	7.0	1.4	0.4	2.0	0.6	2.0
Eagle	3.3	4.5	4.1	2.0	4.8	0.9	6.8	1.5	0.5	0.8	3.0	(2.0
Grace	3.1	2.1	3.6	3.3	5.5	1.9	1.5	4.3	7.6	3.7	4.9	4.7
Hagerman	1.4	1.9	0.9	3.7	2.1	1.9	0.9	1.1	0.4	1.5	1.5	4.0
Hayden Creek	1.6	0.5	0.7	0.4	0.7	1.3	3.2	10.0	3.6	1.6	0.7	1.1
Hayspur	5.2	6.7	12.8	9.6	7.6	4.5	8.4	1.1	1.4	1.0	2.0	1.6
Mackay	0.5	2.3	2.5	2.2	1.2	1.0	1.0	0.9	0.9	0.7	0.9	0.6
Niagara Sp.*	6.6	9.6	9.4	12.8	4.5	6.7	1.4	4.1	0.8	0.4	1.9	4.2
Rapid River*	2.1	1.4	2.1	1.1	2.0	1.8	4.2	1.4	7.5	2.6	1.8	4.9

*Idaho Power Company owned

Table 3. Hatchery flows (cfs) at Idaho hatcheries, 1 October 1979 - 30 September 1980.

Station	Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	20	16	16	16	16	16	16	16	16	16	16	16
Ashton	6	6	6	6	6	6	6	6	6	6	6	6
Clark Fork	2	3	5	5	5	4	5	5	5	5	5	5
Eagle	3	3	3	3	3	3	3	3	3	3	3	3
Grace	15	13	13	14	12	13	13	13	9	13	13	16
Hagerman	87	87	88	88	92	94	98	95	85	81	73	45
Hayden Creek	9	9	9	5	5	5	5	5	5	6	6	6
Hayspur	19	20	20	19	32	19	21	25	24	19	22	20
Mackay	22	22	22	22	22	22	22	22	22	22	22	22
Niagara Sp.*	65	89	100	100	90	75	65	7	12	20	65	102
Rapid River*	46	46	46	15	29	33	18	22	22	25	25	20

*Idaho Power Company owned

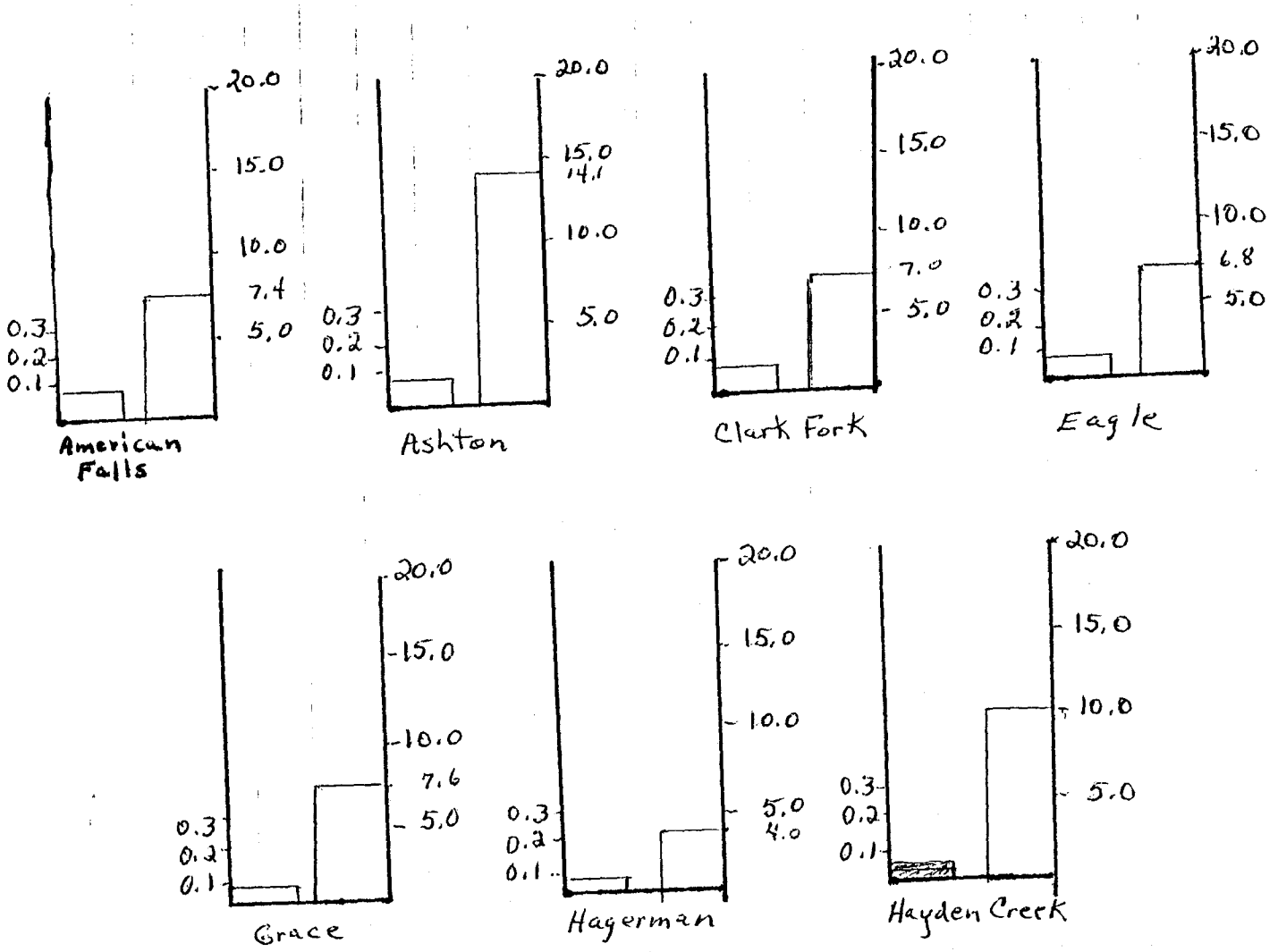

Figure 1. Maximum concentrations attained for settleable and suspended solids during 1 October 1979 - 30 September 1980 at American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman and Hayden Creek hatcheries (settleable solids, ml/l, in left bar and suspended solids, mg/l, in right bar).

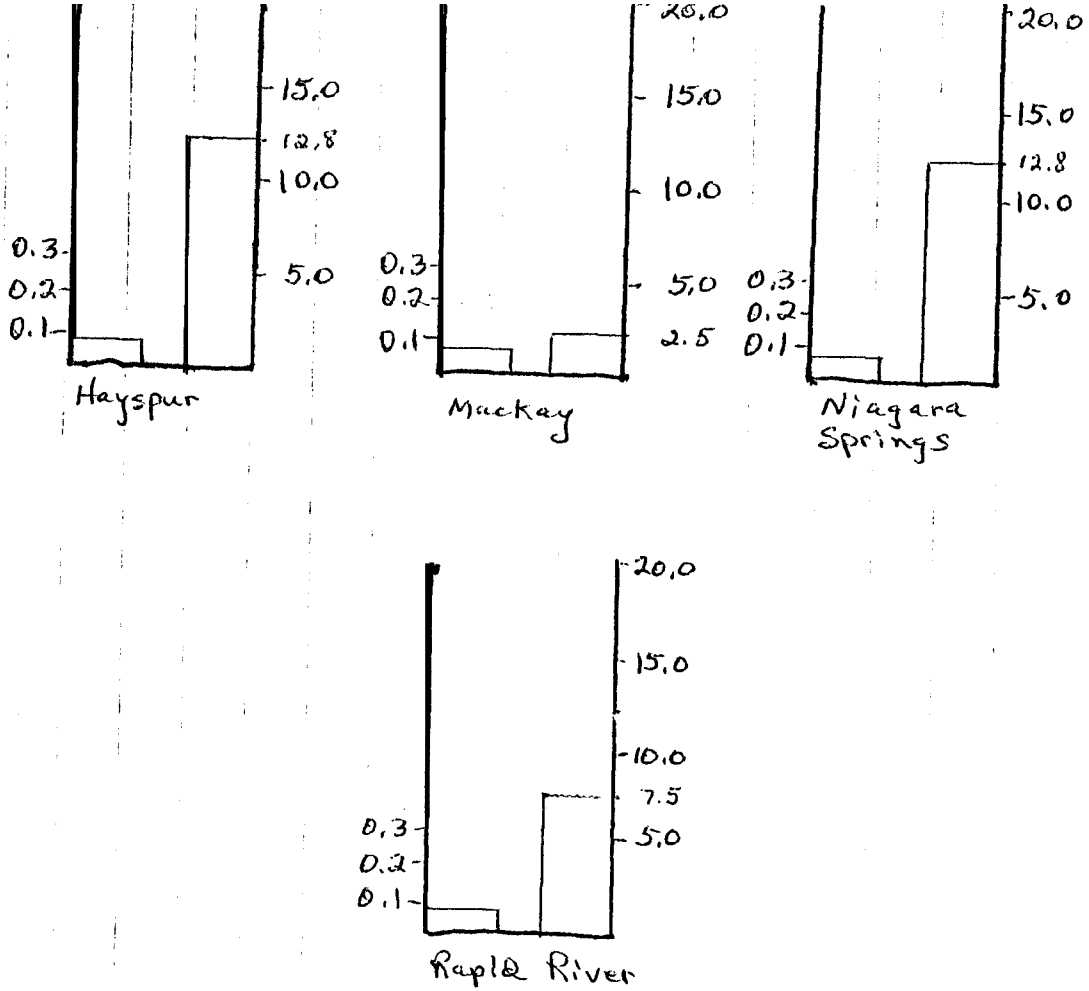

Figure 1. Maximum concentrations attained for settleable and suspended solids during 1 October 1979 - 30 September 1980 at Hayspur, Mackay, Niagara Springs and Rapid River hatcheries (settleable solids, ml/l, in left bar and suspended solids, mg/l, in right bar).